CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society
Of America

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Echeveria setosa
from van Larens "Succulent Book"

CACTUS AND SUCCULENT JOURNAL

Published and Owned by the Cactus and Succulent Society of America, Inc., Box 101, Pasadena, California. A monthly magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. (Membership and subscription $3.00 per year. Foreign $3.00 per year by International money order.) Mail application to SCOTT HASELTON, *Editor*, Box 101, Pasadena, Calif. *Editorial Staff:* THE ENTIRE SOCIETY.

Vol. VIII APRIL, 1937 No. 10

PLEASE NOTE CHANGE OF ADDRESS

Box 101, Pasadena, Calif.

Abbey San Encino Press is now established in Pasadena where your Editor will continue his hobby of publishing the CACTUS JOURNAL for another 10 years! Although the Society does not maintain an office, you may make an appointment with your Editor by addressing Box 101, Pasadena, Calif. Your cooperation in this change will be appreciated.

MEETINGS OF CACTUS AND SUCCULENT SOCIETY OF AMERICA

Sunday, April 25th, 10:30 a. m., joint meeting with the San Fernando Valley Society at Olmstead's Live Oak Manor Cactus Gardens, Old State Highway, Newhall. Bring your picnic lunch. Hot coffee will be provided.

Sunday, May 30th, joint meeting with Arizona Cactus and Native Flora Society at Phoenix, and Boyce Thompson Arboretum. Send to Howard E. Gates, Anaheim, Calif., for information sheet.

Take a Part in Your Journal

Articles in the CACTUS AND SUCCULENT JOURNAL are by voluntary contribution and with no personal or commercial connections. We appreciate the loyal support of the many well known contributors and even the smaller collectors who send in such interesting notes.

Readers miss such contributors as our friend, James West, but we hope that his articles will be continued when he returns from South America. It is most helpful to your Editor to have regular articles such as those by Mr. Eric Walther, Botanist of Golden Gate Park, and the varied and helpful material by Dr. R. W. Poindexter. The quality of the JOURNAL will always depend upon its loyal contributors.

KAKTUS ABC, by Curt Backeberg and F. M. Knuth, 432 pages fully illustrated. Many new species and genera. Written in Danish, but is a necessity for every cactus library. The lists show 500 more species than were recognized by Britton and Rose Cloth bound $5.00. Box 101, Pasadena, Calif.

Euphorbia Enthusiasts

JOURNAL readers will be glad to know that future issues will contain regular articles and photographs on Euphorbias. It is planned to picture the common plants so that readers may become familiar with the names. Please tell us about your Euphorbias and let's make this a live department conducted for and by the many Euphorbia collectors.

NEW LISTS

Knickerbocker Nursery, Rt. 1, San Diego, Calif. 48 page illustrated catalog of cacti and other succulents. The illustrations will help the amateur in naming his plants. Mrs. Bakkers has enlarged her stock materially and has many attractive items. List free.

Mr. Harry Johnson of Johnson Water Gardens states regarding frost resistance:

"It might interest some of your reading public to know that *Titanopsis* seems to be quite hardy as I have seen them withstand almost 10 degrees above zero and also the *Pleiospilos* withstood the same temperatures unprotected."

Cephalocereus fluminensis

The Cephalium-forming Cacti and their Evolutionary Stage

By COUNT F. M. KNUTH, Denmark

A study of the structures of flowers of the cactus family leads to the recognition of a succession of highly interesting distinctive characters from genus to genus. The definition of genera is based mainly upon these characters, as the newer perception of the idea of a cactus genus tends to define such a natural group of species as one having more or less homogenous floral characteristics, under the exclusion of all species having different flowers.

In former times the conception of a genus was different. As the flowers of only a limited number of the then known species had been observed, earlier botanists had to classify species according to their *vegetative* characteristics (root, stem, spines, eventual leaves, etc.), at the same time giving less attention to the flower structures. By this method the large and very complex genera (*Cereus, Echinocactus, Mamillaria, Opuntia,* etc.) came into existence; each of these comprised a great number of species, most of which were very little or not at all related to each other. Although these large genera only constituted a very rough classification of the highly varied forms of the CACTACEAE, it was necessary to retain that system

even till the beginning of our century, owing to the lack of knowledge of the flowers.

During the last years before the world war, our knowledge of the cactus family was, however, considerably enlarged through large botanical expeditions to all the countries where cacti grow; in consequence, our knowledge of the flowers of the species was correspondingly deepened, and the result of this was that the old complex genera were dissected by the removal of group after group of naturally interrelated species and the subsequent erection of these groups as genera of their own.

Thus, the growing of the CACTACEAE now generally accepted, dividing the family into many small, well-defined genera, was attained. The family, now comprising about 1,800 recognized species, is divided into 154 genera, all mainly based upon the floral characteristics. The genera are arranged systematically within the family according to their evolutionary stage, the most primitive forms being arranged at the beginning of the system, and the most highly developed forms at the end.

According to the evolutionary order, *Peireskia aculeata** (syn. *Pereskia pereskia*) consititutes the starting point, this species being the most primitive of all cacti existing in the present geological age.

Let us now try to follow the steps of evolution. We leave the PEIRESKIOIDEAE (or PERESKIEAE) subfamily, and next we meet the second subfamily, the OPUNTIOIDEAE (or OPUNTIEAE). The flowers of the OPUNTIOIDEAE species are never clustered nor stalked (as are many of the PEIRESKIOIDEAE species), but excepting this they have in many respects retained their primitive character. Thus, the flowers are spiny and in many cases proliferating; these both characters are considered primitive.

Now, the reader will possibly ask, how is it possible to determine which characters are primitive and which of higher development?

This is not at all difficult: when the appearance of the flower is similar to that of the stem, the flower is primitive. The theory of this is, said in a popular way, that the flowers are to be considered as transformed stems, and the more these "special purpose stems" differ from the vegetative ones, the farther has the species developed from the primordial form. So, when the ovary and flower tube of an *Opuntia* is tubercled and spiny, exactly as the stem itself, it is clearly seen that it has not developed very far from the joint on which it is borne.

By following the subsequent stages of evolution within the cactus family, we will first meet species where flower bears bristles only, even if the plant itself has spines; then, we will encounter hairy flowers, and, as the next stage, flowers that are absolutely naked, not bearing any spines or hairs at all.

Of such species with completely naked flowers a great many different ones exist. To these highly developed forms belong, for example, all the two hundred and fifty species of the genus *Mamillaria* (syn. *Neomammillaria*) which has the number 143 out of the 154 genera, thus being placed near the upper end of the system. Also many other genera have naked flowers.

Now it would be natural to suppose that no higher stage of development could at all exist; normally, the cactus stems are spiny, and we have observed all the steps of evolution from the spiny to the spineless flower through many intermediate forms. How could, then, further steps towards still higher forms be possible?

Our further studies along the lines of evolution will, however, show us that nature by far surpasses any human imagination.

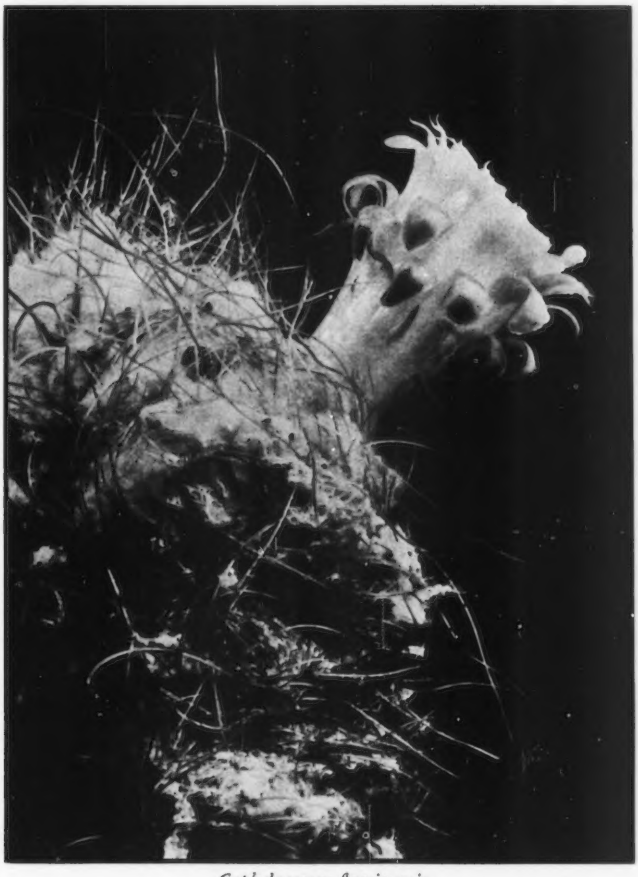
I will explain how: The flowers of most cactus species are produced from the areoles. It is well known that the areoles of a cactus are placed absolutely regularly, for example in a row along the edge of a rib with an interval of an inch. All bunches of spines are almost exactly alike: the number of spines and their form and size are repeated with high accuracy from the lowest to the topmost areole of the rib.

In our study of evolution we have now reached the stage of naked flowers produced from the areoles. We will now meet a remarkable feature as the next stage of evolution: *the highest developed forms of cacti do not produce their flowers from normal areoles; but before these species become capable of flowering, they develop special areoles, and the flowers are only produced from these.*

This phenomenon is showed on the accompanying photos of a flowering *Cephalocereus fluminensis*. The first photo shows a side view of the flower, and it is seen that the flower is shining and naked, spineless, thus constituting a highly developed form. The other photo shows a front view of the flower; on the right side of the plant the normal (sterile) areoles are seen, arranged at regular intervals and furnished with regular clusters of spines.

Furthermore, it is seen on both photos that the flowers are not produced from these areoles, but from a peculiar woolly organ lying from

*EDITOR'S NOTE: See "Cactus ABC" by Backeburg and Knuth. This classification is not according to Britton and Rose "The Cactaceae."



Cephalocereus fluminensis

the top of the plant down along one of the sides. This organ, called a cephalium, is so dense that it completely covers the flower buds and the fruits being developed afterwards.

This cephalium represents the highest stage of development known within the cactus family; it consists of numerous areoles, closely set and not furnished with normal clusters of spines as the sterile areoles, but bearing a greater number of more slender, bristly spines, a part of which are even transformed into soft, whitish, woolly hairs, altogether forming a compact fur, in the interior of which the naked fruit develops, and from which it loosens itself and is pushed out at maturity.

There are several known cephalium-bearing cacti, but they are all very rare. The cephalia of the various species are of a very different structure. Columnar cacti may have *decurrent* (as on the photos), annulate or terminal cephalia. Both the annulate and the terminal ones are deveolped at the ends of the stems; the difference between them is that the species with annulate cephalia make new growth from the center of the cephalium, thus causing it to become ring-shaped and lateral, while the species with real terminal cephalia do not produce further sterile growth from the stems where a cephalium has once been formed.

Also within the globular cacti cephalia are known (*Melocactus, Discocactus*); incidentally, *Melocactus* plants are brought home to these countries by seamen returning from the West Indies, but they never live long in cultivation. The cephalia of these species are terminal, being placed as a cap on the top of a plant of *Echinocactus*-like appearance.

The character of cephalium development is a

most valuable point of support in the study of evolution of the CACTACEAE from the primitive to the highest forms of development. It is my hope that these views will help the cactus friends to observe the structures of the flowers of plants in their collections. Even if the cephalium-forming species are seldom found in collections, and hardly ever with a developed cephalium, hundreds of other forms offer nevertheless a very rich field for comparative studies; hereby there is opportunity to follow the steps of evolution from the original spiny flowers to the more recent naked ones.

If we aim to maintain and revive the interest in cacti, it is imperative that we be not satisfied with scraping together so and so many dozen or hundreds of plants, not even caring whether they be correctly or wrongly named by their more or less competent purveyors; but the pleasure derived from the collection is considerably augmented by limiting oneself to a smaller number of species which, in return, one takes time and care to study thoroughly in growth and flowering. By this way one really acquires a view over the material, and only then can one pretend to be an intelligent collector of cacti.

EDITOR'S NOTE: *The author is specializing in the genus Opuntia and welcomes correspondence regarding Opuntias from their native habitat and new material. Any assistance in his valued investigations will be appreciated by Count Knuth and the Cactus and Succulent Society of America.*

CACTUS SOCIETY TOUR

Visit of Cactus & Succulent Society of America and friends with the Arizona Cactus & Native Flora Society, Sunday, May 29, 1937.

Object: To provide a field tour into the most spectacular cactus stand of the United States and to further the acquaintainship of cactus and succulent fanciers of the southwestern states.

Participants: Any one who is interested in this type of flora regardless of whether they belong to the Cactus & Succulent Society of America, any other Society or none at all.

Schedule: All participants to travel as suits their convenience in time to assemble at a designated point at or near Phoenix at 7 a. m., Sunday, May 29th. From that time, all participants are expected to travel in caravan as directed by the Arizona Society to visit gardens, Papago Park, where an 1100 acre Botanical Garden is planned and onward to the Boyce Thompson Southwestern Arboretum at Superior. Picnic lunch (participants providing their own) will be enjoyed at the Arboretum. At the close of the day's itinerary, participants will be at liberty to return home at their pleasure. All who can are invited to meet at 9 a. m. the following day at the Carnegie Desert Laboratory, Tucson, for an interesting morning's visit.

Costs: None except participants travelling and subsistence costs. Camp sites with stoves and water will be found in Papago Park. Good camp sites, auto courts and hotels are scattered along the way.

Boyce Thompson Southwestern Arboretum: This institution, devoted to the study of desert flora, is located in a wonderful, natural rock garden in a large canyon at the northern foot of picturesque Picket Post Mountain. This alone is worth the trip.

Trophies: The Arizona Society will present a fine copper plaque to the local Society, exclusive of their own, bringing the largest delegation and a nice gift to the person coming the longest distance.

Notification: All persons planning to attend will please notify Howard E. Gates, Anaheim, Calif., at once in order that a final information sheet may be prepared and mailed later. These persons should state whether they will require transportation or whether they can furnish transportation for others and how many. Probably travelling parties may be arranged on a share expense basis. HOWARD E. GATES.

THE STAPELIEAE

Again it is my privilege to congratulate the authors, Mr. Alain White and Mr. Boyd Sloane on the publication of the three superb volumes, the second edition, on STAPELIEAE. The first one-volume edition published in October of 1933, met with an unusually favourable reception by all those interested in the genus *Stapelia* and its allied genera. Now in this short period of three and a half years the same authors bring forward a second edition of three volumes, the result of tireless effort in research in many fields.

Descriptions and illustrations of additional species and varieties brings this outstanding work up to date as nearly as is humanly possible in such a short time. Added geographical interest is found in the elaborate text giving the distribution of species; the interesting chronological notes have been expanded correspondingly. However, the most valuable addition of all are the keys, omitted in the first edition, thus making this work a most welcomed addition to botanical research. The many excellent illustrations in half-tone and the marvelous reproductions of color plates undertaken and admirably executed by the Abbey San Encino Press will also assure its popularity, especially when combined with the very understandable descriptions.

WM. HERTRICH, *Curator, Huntington Gardens.*

Effects of the January freeze upon the Pitahaya in Arizona

By Dr. Ira L. Wiggins

Observations made on a field trip in the Colorado Desert and southwestern Arizona between February 15th and March 10th, indicated that, for the most part, the native cacti of that region apparently had been uninjured by the low temperatures of the past January. The one tragic exception to the ability of our native cacti to withstand injury by severe frosts was found to be the tenderness of *Lemaireocereus thurberi* (Engelm.) Britt. & Rose. Dr. Poindexter mentioned in his recent paper that *Lemaireocereus* was tender, but not only did it suffer in the gardens and nurseries of California and Arizona, it also fared rather badly along the northern limits of its native distribution.

On the southern exposure of the rocky ridge forming the northern side of Gunsight Pass in western Pima County, Arizona, a colony of what had been beautiful specimens of this species was examined on March 7th. Every branch of every plant examined had been killed back for a distance of from six to eighteen inches from the growing point. All of the young lateral branches under a foot in length seemed completely dead. The tips of the injured branches were blackened and flaccid; decomposition was already well under way in some of the younger plants. A careful check of plants growing some distance up the hillside revealed that not only those near the base of the slope, but also those quite near the top of the ridge had been badly damaged. Small specimens under two feet in height appeared to have succumbed.

One encouraging feature was evident. Many of the older plants, those that had attained a height of ten or twelve feet, showed unmistakable signs of similar injuries sustained in the past. Many of the branches of these older plants had the old dry woody central cores projecting a foot or more above the scars that had formed after the pulpy water-storage tissue, killed by low temperatures, had sloughed away. If these plants were able to "come back" after their fingers had been frost-bitten during previous periods of cold weather they may be able to do so again. If, on the other hand, this severe freeze of January, 1937, kills off the colonies of *Lemaireocereus thurberi* in the Ajo Mountains and at other points along the northern fringe of their distribution, the tragedy will lend weight to the biological law recently restated by Dr. Walter P. Taylor* to the effect that " . . . it is the greatest extreme of a year of unfavorable conditions or the greatest extreme of a series of unfavorable years that finally limits the distribution of species. . . . " It is possible that, although the Pitahaya has been able to withstand the shock of slightly less severe freezes during past decades, the somewhat greater severity of the present season's weather may be the final limiting factor in the northern migration of the species. If such be the case we will have witnessed one of the fluctuations in the fortunes of the native plants in their ceaseless struggle with the elements. If the Pitahayas at Gunsight die on the battle field their death will be a tragedy to cactus lovers—to an analytical biologist such a change in the position of the front lines will be of extreme interest, even though, as a cactus enthusiast, he also may regret the death of the vanquished.

I had no opportunity to observe *Lophocereus Schottii* (Engelm.) Brit. & Rose, even rarer than *Lemaireocereus* in the Arizonan deserts, but judging from the appearance of specimens in gardens near Sells and at Ajo, Arizona, probably it too suffered severely in southern Arizona and northern Sonora.

Although the cacti native in the southwestern part of the United States came through the freeze, for the most part, with little or no apparent injury the action of a few cuttings of species that previously had grown readily when transplanted to the Stanford campus suggests that the severe weather had brough about a decided lowering of their resistance. These cuttings were given a light fumigation in carbon bisulphide fumes and transplanted to pots. In the past similar cuttings have grown reasonably well. This spring not one of them has shown any signs of life. Most of them are definitely and totally dead. Is it not possible, therefore, that the freeze alone would not have killed them, nor would the poisonous fumes of the carbon bisulphide alone have been lethal, but that the combination of the two unfavorable conditions was too much for them?

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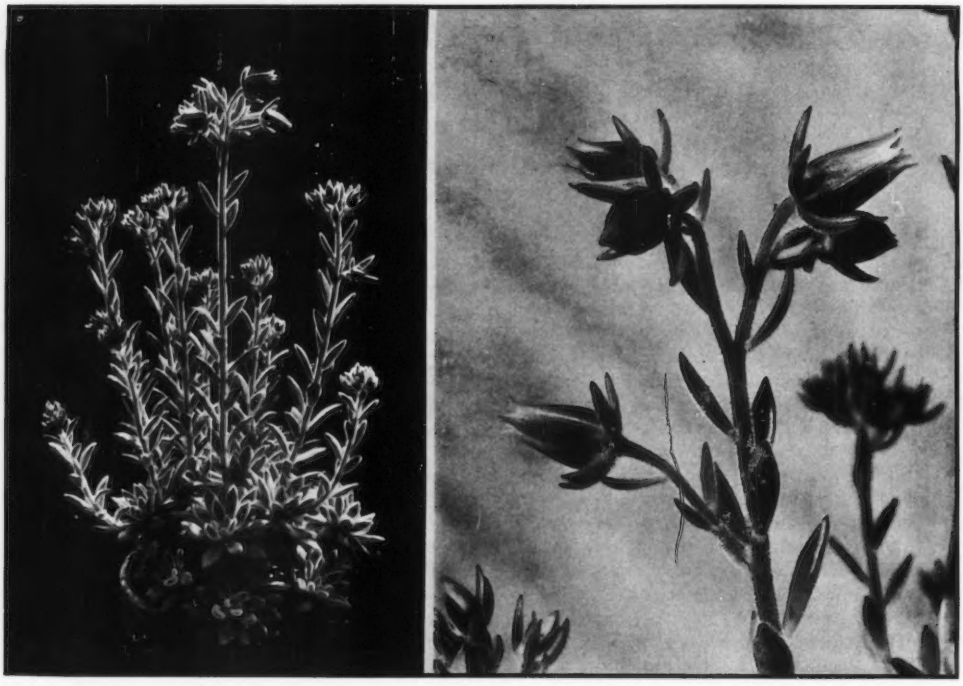
* Taylor, W. P. Significance of extreme or intermittant conditions on distribution of species and management of natural resources with a restatement of Liebig's law of minimums.
Ecology 15: 374-399. 1934.



Echeveria x set-oliver EW. new hybrid

By ERIC WALTHER, Botanist Golden Gate Park

PARENTS: *Echeveria harmsii* (Oliveranthus elegans) x *E. setosa,* the latter being the seed-parent.

ORIGIN: Deliberate cross made early in 1932 by Victor Reiter, Jr.

KEY-POSITION: Near *E. harmsii,* differing in the more numerous flowers borne on each scape, a slightly smaller corolla, more ascending sepals, relatively narrower, more crowded leaves, multicellular hairs, etc.

DESCRIPTION by EW. of plant flowering for the first time in November 1933, in collection of the originator:

"FORM A: *Plant* covered in all external portions with a dense coating of slender, multicellular, uniseriate hairs that are quite colorless except at tips of leaves, bracts and sepals; where they contain the usual anthocyan-red cellsap; *stem* short, but evident; *leaves* many, crowded, ascending to spreading, oblanceolate, acute, about 6 cm. long, 10-15 mm. broad, 6-9 mm. thick, color lettuce-green, tips oxblood-red to maroon; *inflorescence* of 2 or more simple or bifid, secund racemes; *peduncle* slender-flexuose, ascending, to 40 cm. tall inclusive of racemes; *lower bracts* scattered, ascending-spreading, abovate-elliptic-cuneate, acute, to 3 cm. long, spinach-green, red-tipped as the leaves; each *racems* with 8 or more flowers; *upper bracts* linear, appressed; *pedicels* to 17 mm. long, 3 mm. thick, bractless; *sepals* subequal, longest to 12 mm. long, jointed at base, but sutures evident, elliptic-lanceolate, sub-terete, more or less spreading at anthesis, colored as the bracts; *corolla* to 21 mm. long, by 12 mm. in diameter at base and 8-10 mm. wide at mouth, color scarlet-red, but edges of segments apricot-yellow and their tips empire-yellow; *segments* thick, sharply-keeled, deeply hollowed at base, inside empire-yellow; *stamens* subequal, to 16 mm. long; *carpels* pinard-yellow, to 16 mm. long; *styles* very long and slender, pyrite-yellow above; *honey-glands* narrowly-lunate, to 4 mm. long. Flowers in November to January.

FORM B: Identical with the preceding, but inflorescences as many as 12 per plant, each a stout, erect, equilateral panicle, its 3 or more branches each with 3 or more flowers; ultimate pedicels bracteolate, corolla somewhat darker, slightly longer.

REMARKS: One of the most pernicious activities engaged in by amateurs of slight judgment is the indiscriminate raising of hybrids. Unless strict control is exercised, both as to selection of seed- and pollen-parents, followed by ruthless destruction of all inferior seedlings, the results will be only a further cluttering-up, of both gardens and the literature, with more worthless junk.

No such criticism applies to the hybrids described here, for not only do they represent deliberate, intelligent effort directed towards combining in one plant the several desirable features of their parents, but they also are of such self-evident merit as to assure them of further propagation and much wider distribution.

I hope that you will consider a comprehensive 10 or 20 year index for the volumes. Certainly such a set of JOURNALS merit such an index and I do not believe I have seen such a JOURNAL with the mass of scientific information as has the JOURNAL for Succulents. It certainly has given me a lot of pleasure in reading over them not once, but several times. I believe that of all are succulents, I am most partial to the Gasterias* They are very intrigueing of them all.

FRANK T. MCFARLAND, *Univ. of Kentucky.*

EDITOR: Referring to page 123 of the February issue, "What Grows Where," it might have been of interest to the average reader to have it explained that the following names there used are all synonyms of *Opuntia opuntia*:

O. ravinesqui (apparently a misspelling of *O. rafinesqui*).
O. vulgaris.
O. humifusa
O. compressa.

R. W. P.

CHRISTMAS CACTUS

In the September, 1935, issue of the JOURNAL you published my receipe for producing blooms on the common Christmas Cactus. I have a plant which furnishes adequate proof that my system works fairly well.

The growth of the plant would seem to indicate that my ideas regarding water are not far wrong. In fact, I don't think there is any limit to which the forcing of Zygos can be carried. In a six-inch pot, this particular plant represents four years' growth from a single rooted joint. It would measure around two feet in diameter, and had altogether nearly two hundred flowers. Moreover, it is only one of about fifty similar plants, all bowed down with the weight of the blooms.

Another peculiar fact regarding resting came to light with this bunch. They had been resting about three weeks when a rather bad infestation of mealy bug became apparent. The whole of each plant, soil and all, was immersed and soaked in "Volck." The soil became so permeated with moisture that the joints of the plants swelled again, forcing on us a belated resting period. As a consequence, they did not bloom until the latter end of January, and because their selling season is Christmas, we have most of them, in spite of their beauty, still on our hands.

J. CAREY DENNIS, *Canada.*

President Howard E. Gates has been honored by the following appointment:

"In order to stimulate a closer relation in our common interest in developing American horticulture, the officers and directors of The American Horticultural Society have the honor to invite the President of the Cactus and Succulent Society of America to become an Honorary Vice-President of The A. H. S."

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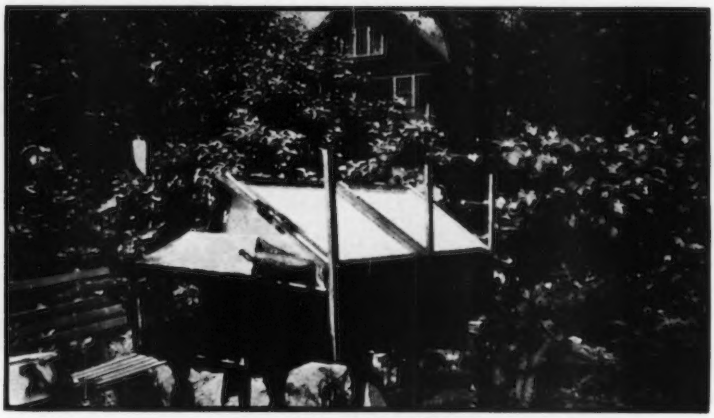
*The JOURNAL has many requests for articles on Gasterias and Haworthias. Can you furnish photos or notes on these two popular genera?



An inexpensive home for cacti

Solving the Glasshouse Problem

"Howdy neighbor! Why the long face? Bet I know, you've just come home to your mess of cacti on the back porch, after spending an hour or so in a neat greenhouse of a lucky member. There all the cacti were doing well, and reaching for the ceiling, weren't they? But your weather beaten stragglers look sick compared to them. If you could only put them in some kind of greenhouse for the warm months, perhaps they might improve. Well, you can, because I have. Here's what I did:

I buried my cacti in a "coffin" and believe me there isn't a dormant tip in the whole box. A *Coryphantha* has whiskers, an *Echinocereus* has a bud. These were dormant for two years. At one end of the "coffin" is a mixture of sand and leaf mold, where I am rooting *Cereus* and *Echinopsis*. The other end is filled with potted *Cephalocereus* and *Neomammillarias,* intermixed with a few cristates and monstrosus. Does that appeal to you? I get quite a kick out of it.

If you are handy with tools, here is all you have to do: As I mentioned before, it is a "coffin" shaped box with one fixed sash, and two hinged sashes. The three uprights serve to open the windows, in case of rain, which is better than water. There are turn buttons on both sides of the uprights. Get two pieces of lumber, one foot by five feet, for the sides. Two for the ends are one foot by 22½ inches, enough bottom pieces, 4½ inches by 5 feet to cover. Nail them together, and that's your "coffin." I lined it inside with one half inch beaver board. Then you buy or make one fixed sash fourteen inches wide by five feet long, divided in middle. Nail this on edgewise, slightly off perpendicular. Supporting it are three pieces one and one half inches by 23½ inches, nailed across the top of box. The other two hinged sashes are put on between these three supports and are flush with them, when closed. This makes the box airtight, except for the ends. The hinged sashes measure 23½ inches by 27 inches. All the lumber I used was ½ inch thick. The finished box is setting on two wooden horses, which keeps it off the ground.

I put copper screening on both ends to permit air to circulate, and keep out the bugs. An important item is covering the windows with muslin or something to keep out the direct sun. You should cook cacti, but not burn them.

Now a word about soil. Fifty per cent leaf mold mixed with equal parts of coarse sand and loam with some lime is fine, and highly recommended. Water thoroughly about three times a month, with rain water, if possible. Then when the rain get colder, towards October, why just get a neighbor to help you, and take the whole thing into the house. That solves your heating problem.

The little glass thing in front of the box is a discarded aquarium. I am trying to raise some seedlings in it. Yep, still trying!

Of course a well built greenhouse is a lot better than this, but in the meantime, why not bury them in a "coffin" like mine and watch them spring to life.

HERMAN LOEWENTHAL, N. Y.

Opuntia opuntia grown by Charles R. S. Leckie, Stanford, Conn. This four year old plant has had no protection and has withstood 30° below zero. This plant had 200 flowers last season.

Opuntia Names

The letter of R. N. Fisk, at p. 126 of the February Journal is of very real interest, as is any new information which adds to our knowledge of the distribution of species. I can make the addition of one more species to Mr. Fisk's list, on the authority of Dr. John K. Small, who states that *Opuntia pollardii* occurs in Delaware, Maryland and New Jersey.

A curious feature of Mr. Fisk's list, which he compiled largely from reports of the State Agricultural Colleges, is that our commonest eastern cactus occurs under five different names: *O. opuntia* (Indiana, New Jersey), *O. compressa* (West Virginia), *O. vulgaris* (Connecticut, Delaware, Maryland, New York, Pennsylvania), *O. humifusa* (Michigan), and *O. rafinesquei* (Arkansas, Iowa, Kentucky). The same species must be intended under all these names, since all occur as synonyms of *O. opuntia* in Britton and Rose. It might well cause the two great authors to turn in their graves to realize that 18 years after the publication of the monumental work the State Agricultural Colleges of all these States had never taken the trouble to check the names of their cacti by reference to THE CACTACEAE. It might be answered that *O. vulgaris,* at least, is a good species, quite distinct from *O. opuntia.* This is so, but the real *O. vulgaris,* a native of South America, is certainly not a native of our north-eastern states.

The joke of the matter is that this many-synonymed species really does have two names, both equally valid. It comes about from there being two schools of nomenclature, the one based on the American Code, formulated by the Nomenclature Commission in Philadelphia, 1904, and the other based on the Rues formulated by the sessions of the International Botanical Congress. In most respects these two sets of rules are in perfect agreement as regards the priority and validity of plant names. But there is one important difference. International Rules forbid a plant to have a specific name identical with the generic name; whereas the American Code permits such combinations. The catalpa tree is an illustration, which I cite from L. H. Bailey's

book, "How Plants get their Names." In America this tree is known as *Catalpa catalpa* Scopoli (1771), but in countries following the International Rules the valid name is *Catalpa bignonioides* Thomas Walter (1788).

Now Britton and Rose followed the American Code and therefore adopted the name *Opuntia opuntia* Karsten (1882), which was recombined from the original Linnaean name *Cactus opuntia,* 1753. But under International Rules, Karsten's combination becomes invalid, and the next combination in point of priority must be substituted.

The next name for the species, after that of Linnaeus, was *Cactus compressus* Salisbury (1796), and this was recombined in 1922 by J. Francis Macbride as *Opuntia compressa.* To Britton and Rose, under the American Code, this was just another synonym, and they dismiss it as such in their Appendix, Vol. iv, p. 259; but for all botanists who accept the International Rules, *O. compressa* becomes the valid name for the species.

Cacti are so peculiarly an American family, it would seem permissable in naming them to follow the American Code; yet we must remember that many of their most serious students live abroad, where International Rules regulate such matters. Therefore it seems to me, whenever the species is referred to in a formal way, where accuracy is important, that it should be called: *Opuntia opuntia* (Linnaeus) Karsten (under International Rules: *Opuntia compressa* (Salisbury) Macbride.

It is interesting to note that, of all the Agricultural Colleges canvassed by Mr. Fisk, that of West Virginia was the only one to mention the plant under its International Rules name. I wonder how many readers of the JOURNAL would recognize it under this name?

ALAIN WHITE.

To Amateurs by an Amateur

By JOHN W. BANKS

However interesting and attractive a cactus plant may be from the standpoint of stem shape, size, spine coloring, formation, etc., the crowning glory of this family is always in the blossom. But, while they may be very attrractive to the eye of man, their natural purpose and precise, almost automatic function is even more attractive and interesting. Nature has most wonderfully provided for perpetuation of species, and evolution of species, through this agency. *Pollenization,* or fertilization of the *Ovules,* is accomplished through this organism with the utmost precision. Attractiveness to insects to promote their assistance in this function is the primary purpose of beauty, and the primary motive of the process.

Regardless of size or form, their construction, purpose, and mechanical process of operation is generally the same. Flower forms, as well as other parts of cactus plants, have definite identifying names, and these apply and are the same without regard as to the size of the blossom. In form, or shape, cactus flowers are either:

1. Rotate—wheel-shaped.
2. Campanulate—bell-shaped.
3. Funnelform—shaped like a funnel.

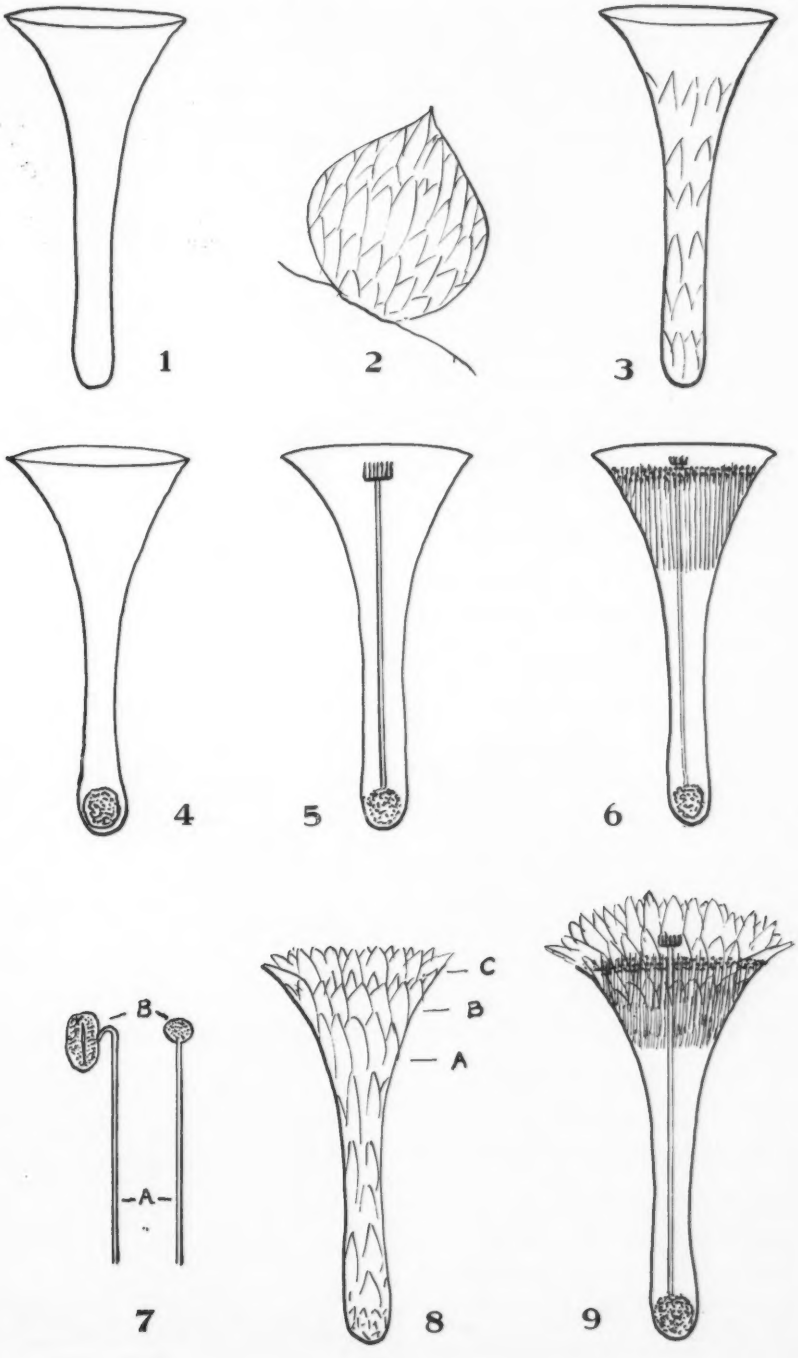
These terms are in turn modified to cover certain variations. For example: "long" funnelform, "short" funnelform, etc., applying in this particular instance to the varying length of the *limb,* etc., and to modify shape characteristics.

To understand the construction and operation of a flower, does not require a scientific mind. The simplicity of this marvelous machine and its method of operation can readily be understood by anyone. The various parts have names, of course, to distinguish them, none of which, however, are cumbersome or too technical to remember.

One essential part is that which provides the housing and protection of the operative parts. This is supplied by the *limb.* The *limb* is the outer portion of a flower connected at the lower end to the parent plant, the other end flaring open and containing the colorful petals of the blossom, and the other organs of the flower. To illustrate we will use a long funnelform blossom of a Cereus, portraying first the shape of the limb—Figure 1.

This first appears on a plant as a small bud, but rapidly extends to its natural length, and is covered with overlapping scales, as shown in Figure 2. From this point, progress is usually very rapid and very soon the limb extends and spreads, as shown in Figure 3.

At the lower end of the limb, or the end which forms the attachment to the plant stem, is an organ called the *ovary.* In the illustration, Figure 4, is shown the location of this organ and


1
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the end has been cut away to show the pithy, granular substances, with which it is filled, known as *ovules*. These *ovules* are the potential *seeds*, only awaiting fertilization through *pollenization*, and development of growth to make them effective in the perpetuation of the species.

At the top, or open end, of the limb we find several parts:

1. The *pistil*. This occupies a central position in the flower, free at the upper end, but connected below to the ovary. It is in two parts (as shown in Figure 5);

The stigma, or as it is commonly called *stigma-lobes*, is the little "fingered" organ at the top of the tube, which is called the *style*. Its purpose is to collect the dust-like *pollen* which bees and other insects collect from the *anthers* and take to the moist, naked *stigma-lobes*.

The *style* is generally a single, slightly tapering stalk with a duct or canal in the center. On the upper end of this "tube" is situated the *stigma-lobe*, the other end being attached to the *ovary*.

Surrounding the stigma-lobe and style, and connected to the "wall" of the limb, but generally not extending below the lower end of the "flare" of the *limb*, are found very numerous little organs called *stamens*. These also are composed of two parts (see Figure 6 and 7):

a. *Filaments* b. *Anthers*

The *filaments* (a) are the stems supporting the *anthers* (b). The *anthers* are the organs on the end of the *filaments* which bear the fertilizing semen called the *pollen*. The pollen is the dry powdery substance covering the *anthers* which collects on the feet and wings of insects, who have been attracted by the nectar in the plant or the odor of the blossom, and this is in turn removed from the insect by the moist *stigma-lobe* when the visitor passes over that organ.

Our blossom, assembled up to this point looks like Figure 6.

This leaves but one more part to be considered —the *perianth segments*—or petals. There are always two, but sometimes three, series of these segments, their position being distinguished by the terms:

a. *outermost perianth segments;*
b. *outer perianth segments;*
c. *inner perianth segments.*

Very often the *Outermost* are very difficult to distinguish as the Scales of the tube in some species become very elongated. All occur in series and from their position are not difficult to segregate. The inner and outer perianth segments of cactus flowers generally vary but little in shape from each other. In the colored flowers the outer segments usually are somewhat deeper and darker in color than the brilliant coloring found in the inner segments (see Figure 8).

We now have all the component parts assembled, a complete blossom, as shown in Figure 9, but to show the connection and operation we will use a figure depicting the blossom cut in half.

From this figure the operation should be easily understood, but to recapitulate: the *limb* provides the protection and support of the organs contained therein; the *stamens* provide and assist in distributing the *pollen;* the *perianth segments* provide for attracting natural assistance in this distribution of *pollen;* the *stigma-lobe* provides the opportunity and the means to remove the *pollen* from the conveyors and passes the *pollen* downward through the *style* into the *ovary*, where natural processes proceed to function in the formation and development of a new plant in embryo. As soon as the period assigned for this proceedure is completed the flower closes, wilts, and sometimes drops off, leaving only the *ovary*, which rapidly develops into a *fruit*, which in turn provides for the protection and development of the *seed*.

As we watch a bud opening into a flower, thus presenting all outer working parts to the view, we learn of another of Nature's provisions for promoting succession. If the flower opens in the daytime, it is termed a *diurnal* (die-urn-all) flower and is usually a highly colored flower; if it opens at night, it is called a *nocturnal* (knock-turn-all) flower and is invariably white. The reason for this is perfectly obvious and needs little explanation, if any. A white flower can be more easily seen by night-flying insects than a colored one. A colored blossom is almost indistinguishable at night, but offers the greater attraction by day.

Flowers are often used as a point in the identification of species, but as they are not always constant in color, they do not provide a very reliable guide. As a rule, however, the flower is generally the same throughout the whole genus.

While it is true that flowers generally are of one of three forms, and are arranged more or less similarly, there is a difference in the shape of the perianth segments—these variations are used in identification.

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On the right margin is the now familiar *Euphorbia polygona,* host of *viscum minimum,* the prickly cushion-shaped plant in the right foreground is *E. aggregata,* a close affinity of *E. pulvinata* which just missed coming into the picture. *E. schinzii* is the prickly mass in the left foreground. A small damaged and somewhat twisted *E. cooperi* is in the center background. *Aloe striata,* with smooth leaves, in the center and species *Gibbaeum* and *Glottiphyllum* in the foreground are readily distinguished.

Astrophytum capricornis var. *minor*